WHAT IS CLAIMED IS:

1. A purified nucleic acid molecule selected from the group consisting of SEQ ID NOS: 7, 8, 9, 10, and 11.

2. A purified nucleic acid molecule encoding a peptide selected from the group consisting of of SEQ ID NOS: 1, 2, 3, and 4.

3. A purified nucleic acid molecule that hybridizes to either strand of a denatured, double-stranded DNA comprising the nucleic acid molecule of any one of claims 1 or 2 under conditions of moderate stringency.

4. The purified nucleic acid molecule as claimed in claim 3, wherein said isolated nucleic acid molecule is derived by *in vitro* mutagenesis from SEQ ID NOS: 7, 8, 9, 10, and 11.

5. A purified nucleic acid molecule degenerate from SEQ ID NOS: 7, 8, 9, 10, and 11 as a result of this genetic code.

6. A purified nucleic acid molecule, which encodes Tc45 polypeptide, an allelic variant of Tc45 polypeptide, or a homolog of Tc45 polypeptide.

7. A recombinant vector that directs the expression of a nucleic acid molecule selected from the group consisting of the purified nucleic acid molecules of claims 1, 2, 4, 5, and 6.

8. A recombinant vector that directs the expression of a nucleic acid molecule of claim 3.

9. A recombinant vector that directs the expression of a nucleic acid molecule of claim 4.

10. A purified polypeptide encoded by a nucleic acid molecule selected from the group consisting of the purified nucleic acid molecules of claims 1, 2, 3, 4, 5, and 6.

11. A purified polypeptide according to claim 10 having a molecular weight of approximately 45 kDa as determined by SDS-PAGE.

12. A purified polypeptide according to claim 11 in post translationally modified form or not.

13. A purified polypeptide encoded by a nucleic acid molecule of claim 3.

14. A purified polypeptide according to claim 13 in post translationally modified form or not.

15. A purified polypeptide encoded by a nucleic acid molecule of claim 4.

16. A purified polypeptide according to claim 15 in post translationally modified form or not.

17. A purified eukaryotic amino acid racemase having a 38 kd to 45 kda more or less 10%.

18. Purified antibodies that bind to a polypeptide of claim 10.

19. Purified antibodies according to claim 17, wherein the antibodies are monoclonal antibodies.

20. Purified antibodies that bind to a polypeptide of claim 13.

21. Purified antibodies according to claim 19, wherein the antibodies are monoclonal antibodies.

22. Purified antibodies that bind to a polypeptide of claim 15.

23. Purified antibodies according to claim 21, wherein the antibodies are monoclonal antibodies.

24. A host cell transfected or transduced with the vector of claim 7.

25. A method for the production of Tc45 polypeptide comprising culturing a host cell of claim 24 under conditions promoting expression, and recovering the polypeptide from the host cell or the culture medium.

26. The method of claim 25, wherein the host cell is selected from the group consisting of bacterial cells, parasite cells and eukaryotic cells.

27. A host cell transfected or transduced with the vector of claims 6 to 9.

28. A method for the production of Tc45 polypeptide comprising culturing a host cell of claim 24 under conditions promoting expression, and recovering the polypeptide from the host cell or the culture medium.

29. The method of claim 28, wherein the host cell is selected from the group consisting of bacterial cells, parasite cells and eukaryotic cells.

30. A host cell transfected or transduced with the vector of claim 9.

31. A method for the production of Tc45 polypeptide comprising culturing a host cell of claim 30 under conditions promoting expression, and recovering the polypeptide from the host cell or the culture medium.

32. The method of claim 31, wherein the host cell is selected from the group consisting of bacterial cells, or parasitic cells or eukaryotic cells.

33. The plasmid deposited at CNCM under the Accession Number I-2221 or I-2344.

34. An immunological complex comprising a Tc45 polypeptide and an antibody that specifically recognizes said polypeptide.

35. A method of detecting a parasite in a biological sample that harbors a polynucleotide sequence according to claim 1, said method comprising the steps of:

(1) contacting parasite DNA of the biological sample with a primer or a probe, which hybridizes with the polynucleotide sequence of claim 1;

(2) amplifying the nucleotide sequence using said primer or said probe; and

(3) detecting a hybridized complex formed between said primer or probe and the DNA.

36. A method of detecting a parasite in a biological sample that harbors a polypeptide according to claims 10 to 16 or fragments or peptides thereof, which can be recognized by antibodies raised against a P38 to P45 kDa racemase, said method comprising the steps of:

(1) contacting the parasite extract or the biological sample with antibodies according to any one of claims 18 to 23; and

(2) detecting the resulting immunocomplex.

37. A kit for detecting a parasite that harbors a polynucleotide sequence according to claim 1, said kit comprising:

(1) a polynucleotide probe, which hybridizes with the polynucleotide sequence of claim 1; and

(2) reagents to perform a nucleic acid hybridization reaction.

38. A kit according to claim 37 comprising:

(1) purified antibodies according to any one of claims 18 to 23, which react with the polypeptide as claimed in any one of claims 10 to 16;

(2) standard reagents as the parasite racemase in a purified form; and

(3) detection reagents.

39. An *in vitro* method of screening for active molecules capable of inhibiting a polypeptide encoded by a polynucleotide sequence according to any one of claims 1 to 6, said method comprising the steps of:

(1) contacting the active molecules with said polypeptide;

(2) testing the capacity of the active molecules, at various concentrations, to inhibit the activity of the polypeptide; and

(3) choosing the active molecule that provides an inhibitory effect of at least 80 % on the activity of the said polypeptide.

40. A purified polynucleotide encoding an eukaryotic protein with an amino acid racemase activity.

41. A purified polynucleotide encoding an eukaryotic protein with a proline racemase activity.

42. A polynucleotide encoding an eukaryotic protein, which is recognized by antibodies raised against an eukaryotic protein having an amino acid racemase activity such as a proline racemase.

43. A polynucleotide according to claim 37 or 38 having at least 80% of identity with the sequence of an eukaryotic gene encoding a protein with a racemase activity.

44. A method of detecting an eukaryotic protein encoded by a polynucleotide as claimed in claim 40 or 41 comprising the steps of:

(1) contacting the sample with antibodies raised against an amino acid racemase such as proline racemase; and

(2) detecting the resulting immunocomplex.

45. A kit for detecting a parasite that expresses a polypeptide encoded by a polynucleotide sequence according to claim 1, said kit comprising:

(1) antibodies raised against an amino acid racemase, such as proline racemase; and

(2) reagents for the detection of an immunocomplex.

46. A method of detection and quantification of presence or absence of a polynucleotide sequence according to any one of claims 1 to 6, or a sequence hybridizing under moderate strinigency with a polynucleotides, according to any one of claims 40, 41, or 42, or a fragment thereof.

47. A fragment of a polynucleotide containing at least 50 nucleotides of the sequence of the proline racemase gene of *T. cruzi* or hybridizing under stringent conditions with a polynucleotide according to any one of claims 40, 41, 42, or 43.

48. A purified eukaryotic protein with an amino acid racemase activity such as a proline racemase.

49. A purified P38 to P45 kDa protein according to claim 48.

50. Purified P38 to P45 kDa according to any one of claims 48 or 49, which is a parasite protein.

51. Purified P38 to P45 kDa protein according to claim 50, wherein the parasite is *T. cruzi*.

52. Purified antibodies against an eukaryotic racemase according to any one of claims 48 or 49.

53. A process of preparation of a purified eukaryotic protein with a racemase activity comprising the following steps:

- selecting a gene encoding a protein having a racemase activity;
- transforming a host with a recombinant vector containing the gene;
- culturing the host and producing the protein encoded by the gene;
- separating the purified eukaryotic protein with the racemase activity from the culture; or
- separating the purified eukaryotic protein recognized by antibodies raised against the protein claimed in any one of claims 48, 49, 50, or 51.

54. A process for detecting a *T. cruzi* infection by contacting purified P45 and fragments or peptides thereof, which are recognized by antibodies raised against a polypeptide claimed in any one of claims 10 to 16, with serum of a patient suspected to be infected.

55. An immunizing composition containing at least a purified protein according to any one of claims 48, 49, 50, or 51, or a fragment thereof, capable of inducing an immune response *in vivo*.

56. An immunizing composition containing at least a purified protein according to any one of claims 48, 49, 50 and 51, or a fragment thereof, capable to induce the inhibition of a mitogenic polyclonal immunoresponse *in vivo*.

57. An immunizing composition against a parasite infection containing at least the purified protein according to any one of claims 48, 49, 50, or 51, or a fragment thereof.

58. A vaccine composition against a *T. cruzi* infection containing the purified 38 to P45 kda protein or a fragment thereof according to claim 51.

59. A process for screening a molecule capable of inhibiting the amino acid racemase activity of an eukaryotic protein comprising the steps of:

- contacting the purified eukaryotic racemase protein with standard doses of a molecule to be tested;
- measuring inhibition of racemase activity; and
- selecting the molecule.

60. A method of inhibiting an eukaryotic protein with an amino acid racemase activity, which comprises treating a patient by administering an effective amount of a molecule that inhibits said eukaryotic protein.

61. Method according to claim 60, wherein the parasite is *T. cruzi*.

62. A method for producing an eukaryotic recombinant amino acid racemase comprising the following steps:

(a) culturing a bacterial or a eukaryotic host harboring an over expression system including an insert containing a polynucleotide sequence encoding an eukaryotic amino acid racemase;

(b) separating the recombinant eukaryotic amino acid racemase from the host proteins; and

(c) purifying the eukaryotic amino acid racemase.

63. A method according to claim 62, wherein the amino acid racemase is a proline racemase.

64. A method according to claim 62, wherein the recombinant bacterial host contains an insert derived from the insert contained in the strain deposited at CNCM under Accession number I-2344.

65. A method for the production of D-amino acid using a purified eukaryotic amino acid racemase comprising the steps of:

(a) incubating L-amino acid with the recombinant eukaryotic amino acid racemase;

(b) separating the D-amino acid produced in step a; and

(c) purifying the D-amino acid.

66. A method of preventing or inhibiting infection by a virus *in vivo*, wherein the method comprises administering to a subject in need thereof a virus mitogen in a sub-mitogenic amount sufficient to induce a protective immune response against the virus in the subject.

67. The method of claim 66, wherein the virus mitogen is administered to the subject in admixture with a pharmaceutically acceptable carrier.

68. The method of claim 66, wherein the virus mitogen is an animal or human virus mitogen in natural or recombinant form.

69. A method of preventing or inhibiting infection by a protozoan parasite *in vivo*, wherein the method comprises administering to a human in need thereof a protozoan parasite mitogen in a sub-mitogenic amount sufficient to induce a protective immune response against the protozoan parasite in the human.

70. The method of claim 69, wherein the protozoan parasite mitogen is administered to the human in admixture with a pharmaceutically acceptable carrier.

71. The method of claim 70, wherein the protozoan parasite mitogen is a mitogen of *Plasmodium berghei* in natural or recombinant form.

72. The method of claim 70, wherein the protozoan parasite mitogen is a mitogen or *plasmodium falciparum* of *plasmodium vivax* in natural or recombinant form.

73. Any molecular modification of the gene or a fragment of the gene encoding for a racemase/mitogen that leads to the inhibition of the expression of the protein by the parasite or virus (gene knock out), and further utilization of parasites or viruses lacking those activities *in vivo* aiming at immunoprotective responses.

74. Any molecular modification of the gene or a fragment of the gene encoding for a racemase/mitogen that leads to the hyperexpression of the protein by the parasite or virus

(gene transgenesis), and further utilization of the parasite or virus to produce high amounts of the protein aiming at producing high amounts of the native protein.

75. Any molecular modification of the gene or a fragment of the gene encoding for a racemase/mitogen that leads to an attenuation of parasite or virus infectivity, or interaction with a host cell, and further injection of the parasites or viruses *in vivo* aiming at immunoprotective responses.

76. Any molecular modification (for instance directed mutagenesis) of the protein or of its active site that leads to the inhibition of its enzymatic or its mitogenic activity and further injection of mutated parasites or viruses *in vivo* aiming at immunoprotective responses.

77. Use of any molecular or biochemical modification of the enzymatic activity of the racemase (inhibition of the active site) aiming at developing specific immunotherapy.

78. Any molecule or compound that inhibits the enzymatic activity of the protein aiming at developing a drug against parasite or virus infection or specific treatment of parasitic or viral disease.